IRW

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Mr. Wayne Langel

Primary Examiner

Art Unit: 1754

Application/Control Number: 10/626, 688

Dear Mr. Langel:

Thank you for your response to my patent application; however, frankly speaking, I am terribly disappointed to learn that you have rejected all of my 21 claims over a single reference, which unfortunately was left out in your original "Notice of References Cited". I do, however, thank you for your kindness in responding quickly to my request for this reference while I was in Taiwan a few weeks ago. I will try to respond in order to your rejection of my patent (which you based on some casual similarities of it to the one of Ayers) by pointing out a number of significant differences between these two approaches for making hydrazine. The most important difference relates to the much larger quantity of hydrazine that can by produced by the process I am attempting to patent compared to the slower (lower density) process proposed by Ayers. Moreover, my patent offers specific laser requirements that arise from considerations of the physics and chemistry involved in my invention and that must be met for my process to work. Ayers, on the other hand, makes no specific statements for how or for what purpose a laser needs to be employed in order to aid in the production of hydrazine in his patent.

To begin, I ask you to consider a quotation from 35 U.S.C. 103(a) that you cited:

(a) A patent may not be obtained, though ... title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which the subject matter pertains.

The prior art for forming hydrazine that has been proposed by Ayers is a hydrogen insertion reaction while mine is not. His statement in the paragraph bridging columns 11 and 12, which merely states that the nitrogen includes linearly absorbed (single) photons from a laser, is also stated to augment the process, but this is too vague and general a statement to be provable or true. As shown in great detail in my patent application, in order to form hydrazine by reacting hydrogen molecules (H_2) with nitrogen molecules (N_2), it is absolutely necessary that the laser wavelengths must be judiciously chosen to promote a 2-photon nonlinear process and that, for my scheme to work the laser intensities must be at least 10^{11} W/cm^2 or a factor of ten more. Neither of these numbers are available to people of ordinary skill in the art of laser/matter interactions, and these critical numbers would be different for exciting nitrogen in a hydrogen insertion process, where the speed of the reaction is controlled by a hydrogen diffusion process. One needs to be well-versed in nonlinear optics, which does not qualify as ordinary skill in the art, in order to appreciate that the physics and chemistry involved in my invention and that of Ayers are completely different.

Secondly, I am somewhat confused by your statement regarding my claim 1.

You said that hydrazine formation by applying high pressure was suggested by Ayers at column 4 lines 25-27, when, in fact, exactly the opposite was stated there by Ayers. In this connection, it should be pointed out that Ayers wants to avoid high pressures and high temperatures, while my invention must employ high pressures (and therefore produce hydrazine at much higher rates than proposed by Ayers), but it also must operate at low temperatures. This again is due to the fact that the physics and chemistry used are totally different between Ayers' and my approaches.

Thirdly, regarding my claims 2-11, the reason for cooling the reaction is not to obtain liquid hydrazine, but to avoid high temperature operation for this industrial-sized process. Even if hydrazine were not a liquid at room temperature, cooling is still required to avoid material failure, which may lead to a dangerous explosion. The fact that hydrazine is a liquid at room temperature is simply an additional benefit for the present invention.

Fourthly, regarding my claims 12-21, it is untrue to state that the excited nitrogen of Ayers can react with water to form hydrazine. This is again due to the fact that the physics and chemistry required for such a formation is by no means certain. I gave a detailed description of the physics involved in my invention to remove these uncertainties and to confirm the workability of my invention, i. e., see Pages 11-25. Finally, in your citation of Burwell et al disclosing the reaction of vibrationally excited nitrogen, the physics described there is inadequate to be of any use in the construction of a workable invention.

I have also dealt with the quotation from the second paragraph of 35 U.S.C. 112, which was cited in your Office Action. I again thank you for these comments. In response to them, I have modified claims 1, 2, 3, 5, 6, 11, 12, 13,

16, and 17 in order to eliminate any non-quantitative statements for your reconsideration. Also claim 12 is now modified as in claim 12 (A) for practical application such as those involved in industrial production.

I firmly believe that your reasons for rejecting my claims 1-21 have focused too much on what is vaguely similar and not enough on what is significantly different. Moreover, with the inclusion of the above modifications, what appears to be non-quantitative in my patent will no longer exist. The manuscript therefore satisfies the requirements for a patent in that it is in complete accord with 35 U.S.C. 103 (a) as well as 35 U.S.C. 112. Thus, I would appreciate it very much that you can accept my application as set forth herewith.

Sincerely,

Ching-Sung Chang

Ching-Sung Chang

Encl.